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Claims

[c1] A compact line of sight stabilization system for use with an imaging system located about an unstable carrier platform, said stabilization system comprising
at least two mirrors, each of said mirrors being mounted to a fixed platform by aiming means;
said aiming means allowing independent rotation of said mirrors about at least one of the axes in the plane of said mirrors;
at least one of said mirrors being mounted by aiming means allowing rotation about at least two of said axes;
a hardware control means for directing said aiming means;
said stabilization system being mounted in the line of sight of said imaging system;
said stabilization system providing at least one of pitch, roll, yaw, and forward motion compensation corrections while maintaining consistent image orientation, for said imaging system.

[c2] A stabilization system as in Claim 1 wherein said imaging system comprises at least one of a pushbroom, whiskbroom, fourier transform, and electronically tun-

able filter type sensor systems.

[c3] A stabilization system as in Claim 1 wherein said imaging system comprises one of a multispectral, hyperspectral, or ultraspectral sensor system.

[c4] A stabilization system as in Claim 1 wherein said carrier platform is selected from an airplane, a helicopter, a satellite, an automobile, or a boat.

[c5] A stabilization system as in Claim 1 wherein said aiming means is selected from at least one of mechanical, piezoelectric, and electromagnetic means.

[c6] A stabilization system as in Claim 1 wherein said hardware control means receives movement data from at least one of pitch rate, roll rate, yaw rate, and forward motion rate sensors.

[c7] A stabilization system as in Claim 6 wherein said sensors exist independently of said stabilization system.

[c8] A stabilization system as in Claim 6 wherein said sensors comprise at least one of an inertial measurement system and an attitude and heading reference system.

[c9] A stabilization system as in Claim 8 wherein at least one of said sensors comprises three orthogonal gyrometers.

[c10] A stabilization system as in Claim 6 wherein said hardware control means comprises a computer system receiving said movement data from said at least one sensor, said computer system additionally comprising algorithm means for determining the current angle of said carrier platform from said sensor data and the integration over time of said movement rates.

[c11] A stabilization system as in Claim 10 wherein said mirrors are aimed responsively to said current angle of said carrier platform.

[c12] A stabilization system as in Claim 11 wherein said computer system comprises additional algorithms to predict subsequent angles for said carrier platform from said movement data and said current angle.

[c13] A stabilization system as in Claim 12 wherein said predictive algorithm additionally accounts for at least one of system noise, drift, and temperature-induced errors.

[c14] A stabilization system as in Claim 12 wherein said hardware control means aims said mirrors to compensate for said predicted new angle, before said carrier platform reaches said new angle.

[c15] A stabilization system as in Claim 12 further comprising a feedback algorithm wherein said feedback algorithm

determines whether said line of sight matches the line of sight obtained from said predictive angle algorithm.

[c16] A stabilization system as in Claim 15 wherein said hardware control means applies an optimization algorithm to compensate for mismatches found by said feedback algorithm.

[c17] A stabilization system as in Claim 1 wherein said aiming means causes at least one of said mirrors to rotate such that said mirrors adjust said line of sight of said imaging system providing compensation for at least one of pitch, roll, yaw, and forward motion.

[c18] A stabilization system as in Claim 1 wherein said imaging system requires a stable and non-changing image for a relatively long exposure time and wherein said stabilization system provides said forward motion compensation to provide said imaging system with said non-changing image.

[c19] A stabilization system as in Claim 1 wherein said imaging system is an ultraspectral imaging system and wherein said long exposure time is sufficient to capture the complete interferogram.

[c20] Hardware control means for a compact line of sight stabilization system, said stabilization system comprising at

least two mirrors in the line of sight of an imaging system for use on a carrier platform capable of being unstable, said mirrors capable of being aimed,
said hardware control means receiving movement data from at least one of pitch rate, roll rate, yaw rate, and forward motion rate sensors,
said hardware control means aiming said mirrors as required providing at least one of pitch, roll, yaw, and forward motion compensation.

[c21] Hardware control means as in Claim 20 comprising a computer system receiving said movement data, said computer system additionally comprising algorithm means for calculating the current angle of said carrier platform from said movement data and the integrating over time of said movement rates.

[c22] Hardware control means as in Claim 21 wherein said mirrors are aimed responsively to said calculated current angle of said carrier platform.

[c23] Hardware control means as in Claim 22, said computer system storing said carrier platform current angles over time, wherein said algorithm means applies said movement data to said stored angle data to predict subsequent new angles of said carrier platform.

[c24] Hardware control means as in Claim 23 wherein said predictive algorithm additionally accounts for at least one of system noise, drift, and temperature-induced errors.

[c25] Hardware control means as in Claim 23 wherein said hardware control means aims said mirrors to compensate for said predicted new angle, before said carrier platform reaches said new angle.

[c26] Hardware control means as in Claim 23 further comprising a feedback algorithm wherein said feedback algorithm determines whether said line of sight matches the line of sight obtained from said predictive angle algorithm.

[c27] Hardware control means as in Claim 26 wherein said hardware control means applies an optimization algorithm to compensate for mismatches found by said feedback algorithm.